

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

In re Patent Application of

Date: October 28, 2008

Applicants: Bednorz et al.

Docket: YO987-074BZ

Serial No.: 08/479,810

Group Art Unit: 1751

Filed: June 7, 1995

Examiner: M. Kopec

For: NEW SUPERCONDUCTIVE COMPOUNDS HAVING HIGH TRANSITION  
TEMPERATURE, METHODS FOR THEIR USE AND PREPARATION

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**REPLY TO EXAMINER'S ANSWER**

**Dated 08/20/2008**

**Supplement 2**

## ARGUMENT

At the top of page 217 of Brief Volume 1 states:

The Examiner further states at page 10 of the Final Action:

Applicant has provided an enabled disclosure for superconductive compositions containing a transition metal oxide containing at least a) an alkaline earth element and b) a rare-earth element of Group IIIB element (pages 5-8 of Rejection mailed 2/28/04).

Applicants disagree that their disclosure is so limited for the reasons given above.

At the top of page 217 Brief Volume 1 states:

The Examiner further states at page 10 of the Final Action:

Applicant has provided an enabled disclosure for superconductive compositions containing a transition metal oxide containing at least a) an alkaline earth element and b) a rare-earth element of Group IIIB element (pages 5-8 of Rejection mailed 2/28/04).

Applicants disagree that their disclosure is so limited for the reasons given above.

Applicants note that paragraph 19 at page 170 of Brief Volume 1 states:

Paragraph 19 of each DST AFFIDAVIT in referring to the table of paragraph 18 states that the first composition,  $\text{La}_2 \text{Cu O}_{4+\delta}$ , has the form  $\text{RE}_2\text{CuO}_4$  which is explicitly taught by Bednorz and Mueller. The  $\delta$  indicates that there is a nonstoichiometric amount of oxygen. Since the table has an asterisk in column 5, as noted in paragraph 16 above, the first composition is not included in the allowed claims although explicitly taught by Applicants.

The Brief Volume 1, page 57, lines 3 -3 4 from the bottom states "The present specification teaches at page 11, lines 22-23, that RE stands for the rare earths (lanthanides) or rare earth-like elements." Brief Volume 1, page 180, paragraph 23, states "the rare earth elements are Sc, Y, La, Ce, Pr, Nd, Pm, Sm, Eu, Gd, Tb, Dy, Ho,

Er, Tm, Yb, and Lu.” (Emphasis added.) Applicants’ specification teaches at page 11, line 19 to page 12, line 5:

An example of a superconductive compound having a layer-type structure in accordance with the present invention is an oxide of the general composition  $RE_2 TMO_4$ , where RE stands for the rare earths (lanthanides) or rare earth-like elements and TM stands for a transition metal. In these compounds the RE portion can be partially substituted by one or more members of the alkaline earth group of elements. In these particular compounds, the oxygen content is at a deficit. For example, one such compound that meets this general description is lanthanum copper oxide  $La_2CuO_4$  in which the lanthanum

Thus the Examiner’s reason for allowance explicitly excludes a composition,  $La_2 Cu O_{4+\delta}$ , explicitly taught by Applicants, that is a known High Tc superconductor. Applicants believe it is inconsistent with the United States Patent law to deny Applicants a claim including such a disclosed species. The Examiner’s reason for what the Examiner has allowed is inconsistent with what Applicants have taught is a High Tc superconductor ( $RE_2CuO_4$  ;  $La_2 Cu O_{4+\delta}$  ) and which is know to be a High Tc superconductor made following Applicants’ teaching. The Examiner has “deemed” not enabled what is in fact enabled and explicitly taught. This is an error of fact.

Brief Volume 1 page 208, lines 3 -5, states “Schuller paragraph 1 refers to ‘the serendipitous discovery of superconductivity in  $MgB_2$ ’ and Schuller paragraph 3 refers to ‘Therefore their discovery has been based largely on empirical approaches, intuition, and. even serendipity.’”

As stated at page 207 Brief Volume 1, lines, “Schuller paragraph 2 also states ‘similar (probable?) searches after the discovery of superconductivity in  $MgB_2$  have not uncovered any new superconductors.’” As stated in Brief Volume 1 page 223, lines 13 – 14 from the bottom, “Schuller also states that similar searches bused on  $MgB_2$  have been done, thereby being enabled [by Applicants’ teaching] even though not finding as many high Tc species.”

At the bottom of page 208 Brief Volume 1 states, "As noted above Applicants' specification explicitly teaches high Tc compositions containing Mg, Mg is an alkaline earth element. See Brief Volume 2 for details at page 138-139."

Brief Volume 1 page 214, lines 10 – 11 from the bottom, states "Brief Attachment BL contains Pages E-85 to E-100 of the "CRC Handbook of Chemistry and Physics 59<sup>th</sup> Edition 1978-1979. Pages E- 89 to E-97 lists about 790 superconductive compositions that have Tc less than 26 K.

As stated in the Brief Volume 1 at page 201 in paragraph 19 and at page 203 in the sentence preceding paragraph 20,  $\text{MgB}_2$  is a layered material. Applicants' specification has identified layered as a property of high Tc superconductors. Also, see Applicants' original claim 9 which states the material is layered. As stated in the last paragraph of page 54 of Brief Volume 1 "Mg is an alkaline earth element." Applicants teach throughout the specification compositions containing alkaline earth elements. See for example, claim 428 and the support therefore at page 138-139 of Brief Volume 2. As stated in Brief Volume 1 page 207, line 2 – 3 from the bottom, the composition  $\text{MgB}_2$  is made by the same type of process as described applicants' specification. Thus Applicants' specification explicitly teaches Mg containing compounds and layered materials as examples of high Tc materials. Brief Attachment BL contains a table from the Handbook of Chemistry and Physics that lists about 790 superconducting materials having a Tc less than 26 K known prior to Applicants' discovery. Those materials include materials having Mg as a constituent and B as a constituent. See Page E-90 of Brief Attachment BL which lists the following compounds containing B:

<i>Substance</i>	<i>T<sub>c</sub>, °K</i>
BCMo <sub>2</sub>	5.4
B <sub>0.03</sub> C <sub>0.51</sub> Mo <sub>0.47</sub>	12.5
BCMo <sub>2</sub>	5.3-7.0
BHf	3.1
B <sub>6</sub> La	5.7
B <sub>12</sub> Lu	0.48
BMo	0.5 (extrapolated)
BMo <sub>2</sub>	4.74
BNb	8.25
BRe <sub>2</sub>	2.80, 4.6
B <sub>0.3</sub> Ru <sub>0.7</sub>	2.58
B <sub>12</sub> Sc	0.39
BTa	4.0
B <sub>6</sub> Th	0.74
BW <sub>2</sub>	3.1
B <sub>6</sub> Y	6.5-7.1
B <sub>12</sub> Y	4.7
BZr	3.4
B <sub>12</sub> Zr	5.82
BaBi <sub>3</sub>	5.69

And see Page E-90 E-94 of Brief Attachment BL which lists the following compounds containing Mg:

<i>Substance</i>	<i>T<sub>c</sub>, °K</i>
LaMg <sub>2</sub>	1.05
Mg <sub>0.47</sub> Tl <sub>0.53</sub>	2.75
Mg <sub>2</sub> Nb	5.6

Thus it would have been obvious for a person of ordinary skill in the art after Applicants' discovery to try MgB<sub>2</sub> to determine if it had a T<sub>c</sub> greater than or equal to 26 K. Moreover, MgB<sub>2</sub> is made as taught in Applicants' specification and is layered as

taught by applicants. See the last Paragraph of the discussion of the Schuller Enablement Statement in Brief Volume 3, page 9. Thus  $\text{MgB}_2$  is enabled by applicants teaching, but may be unobvious having unexpected results. Schuller Paragraph 1 (see bottom of Brief Volume 1 page 194) states:

Moreover, it seems that to date there are no clear-cut directions for searches for new superconducting phases, as shown by the serendipitous discovery of superconductivity in  $\text{MgB}_2$ .

The “the serendipitous discovery of superconductivity in  $\text{MgB}_2$ ” referred to in Schuller Paragraph 1 does not indicate that  $\text{MgB}_2$  is not enabled by Applicants’ teaching, but since it has physical properties Applicants’ specification teaches a high  $T_c$  material has and is made as Applicants’ specification teaches, it is enabled by Applicants’ teaching. Thus the “the serendipitous discovery” is an unexpected result that may mean it is unobvious in view of Applicants’ teaching. As stated in brief Volume 1 page 74 the CCPA states in *In re Fisher* 166 USPQ 18, 24 that:

It is apparent that such an inventor should be allowed to dominate the future patentable inventions of others where those inventions were based in some way on his teachings. Such improvements, while unobvious from his teachings, are still within his contribution, since the improvement was made possible by his work.

Thus following *In re Fisher* since applicants have enabled  $\text{MgB}_2$ , whether or not it is unobvious in view of Applicants’ teaching, Applicants should be allowed a claim that dominates it.

Applicants request the Board to reverse the rejection of all claims rejected under 35 USC 112, first paragraph, as not being enabled.

The Appendix to this First Supplemental Reply lists typographical errors in the Brief in addition to those listed in the Appendix of the Reply. The corrected text is listed with

deletions in bold between bold double brackets, i.e., **[[text]]**, and additions in bold underlined, i.e., **text**.

Please charge any fee necessary to enter this paper and any previous paper to deposit account 09-0468.

Respectfully submitted,

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**APPENDIX TO REPLY SUPPLEMENT 2**  
**Correction to**  
**Typographical Errors in the Brief**

**In the Brief Volume 1 at page 37, lines 9-16,**  
**make the following change.**

The "Sixteenth Supplemental Response" submitted 01/31/2008, which was not entered at the time of submission of this Brief, provides a reference in Attachment A thereof, which is Brief Attachment **[[BL]] BK**, published in 1986 giving a summary of temperature control apparatus. Brief Attachment **[[BL]] BK** is the table of contents, the Preface and Chapter 1 of the book "Cryogenic Engineering" by B. A. Hands, Copyright 1986, Published by Academic Press, Inc. Chapter 1 is entitled "Survey of Cryogenic Engineering."

**In the Brief Volume 1 at page 180, paragraph 23,**  
**make the following change.**

Paragraph 23 of each DST AFFIDAVIT note that the rare earth elements are Sc, Y, La, Ce, Pr, Nd, Pm, Sm, Eu, Gd, Tb, Dy, Ho, Er, Tm, Yb, and Lu. See the Handbook of Chemistry and Physics 59th edition 1978-1979 page B262 in Brief **[[Appendix]] Attachment A**. The transition elements are identified in the periodic table from the inside front cover of the Handbook of Chemistry and Physics in Brief Attachment A.

**In the Brief Volume 1 at page 196, paragraph 7,**  
**make the following change.**

In Paragraph 7 of the Newns Affidavit Dr. Newns states that he is submitting his **[[declaration]] affidavit** to clarify what is meant by predictability in theoretical solid state science. Dr. Newns notes that all solid state materials, even elemental solids, present theoretical problems.

**In the Brief Volume 1 at page 196, paragraph 9,**  
**make the following change.**

The electrical conductivity of the semiconductor is controlled by adding dopants to the semiconductor crystal that either add electrons to the empty valence band or removes electrons from the filled valence band.

**In the Brief Volume 1 at page 212, lines 3 - 6 from the bottom,**  
**make the following change.**

**[[If t]]The Examiner [[does not]] entered the Seventeenth Response After Final, in the Examiner's Answer [[Applicants respectfully request the Bard to take judicial notice of this, since]]. [[t]]This is information known to persons of skill in the art and should be known to the Examiner who referred to BSCCO in the Final Rejection.**

**In the Brief Volume 1 at page 214, lines 7 - 8 from the bottom,**  
**make the following change.**

Applicants resubmitted this with the Sixteenth Supplemental Response **[[requesting reconsideration and entry]] which the Examiner's Answer entered** into the record.

**In the Brief Volume 1 at page 216, lines 2 - 5 from the bottom,  
make the following change.**

The Examiner does not indicate species that come within the scope of Applicants' claims that cannot be made following Applicants' teaching, but which are in fact high Tc superconductors.

**In the Brief Volume 1 from page 222, line 3 from bottom  
to the last line of page 223,  
make the following change and reformatting of indenting block quotes.**

**Moreover, in Continental Can Co. v. Monsanto Co the CAFC stated:**

[t]o serve as an anticipation when the reference is silent about the asserted inherent characteristic, such gap in the reference may be filled with recourse to extrinsic evidence. Such evidence must make clear that the missing descriptive matter is necessarily present in the thing described in the reference, and that it would be so recognized by persons of ordinary skill. In re Oelrich, 666 F.2d 578, 581, 212 U.S.P.Q. (BNA) 323, 326 (CCPA 1981) (quoting Hansgirk v. Kemmer, 26 C.C.P.A. 937, 102 F.2d 212, 214, 40 U.S.P.Q. (BNA) 665, 667 (CCPA 1939)) provides:

Inherency, however, may not be established by probabilities or possibilities. The mere fact that a certain thing may result from a given set of circumstances is not sufficient. [Citations omitted.] If, however, the disclosure is sufficient to show that the natural result flowing from the operation as taught would result in the performance of the questioned function, it seems to be well settled that the disclosure should be regarded as sufficient"

Continental Can Co. v. Monsanto Co., 948 F.2d 1264, 1268-1269 (Fed. Cir. 1991).

Thus when the Examiner rejected Applicants' composition claims because the high Tc property was inherent in the teaching of the cited prior art references, the Examiner was acknowledging that persons of skill in the art prior to Applicants' earliest filing date knew how to make samples having the high Tc property which necessarily means that persons of skill in the art knew how to make those compositions. The

Examiner does not explain how an apparatus, that uses a composition that a skilled artisan knows how to make, is not enabled **[[. W]]**when the structure of the apparatus is well known except for the fact that the composition is a **high T<sub>c</sub>** superconductor, which fact is the innovative discovery. The apparatus for conducting a superconductive current in certain materials having a T<sub>c</sub> < 26 K was well known prior to Applicants' discovery.

**In the Brief Volume 1 page 222, lines 16 - 18,**  
**make the following change.**

Schuller also states that similar searches b**[[u]]**ased on M<sub>9</sub>B<sub>2</sub> have been done, thereby being enabled even though not finding as many high T<sub>c</sub> species.

**In the Brief Volume 1 page 224, lines 7 - 11,**  
**make the following change.**

5) the CRC Handbook of Chemistry and Physics (Brief Attachments **[[BL]] AC and BB**) which cites numerous species of high T<sub>c</sub> materials which can be made according to Applicants' teaching;

6) the Poole 1995 (Brief Attachment **[[2]]Z**) which states that the high T<sub>c</sub> materials are layered perovskites as Applicants states they were in their initial publication for which they received the 1987 Nobel Prize;

**In the Brief Volume 1 page 230, lines 16 - 18,**  
**make the following change.**

This statement has been referred to in the Brief Volume **[[4]] 3** as the Examiner's First Enablement Statement. It is un rebutted that persons of skill in the art know how to test material to determine whether they have a  $T_c$  greater than or equal to 26 K.

**In the Brief Volume 2 page 2, 3 lines from the bottom**  
**to page 3, line 4,**  
**make the following change.**

Some of these are described in "Cryogenic Engineering" by Hands 1986 (Brief Attachment BK) which was submitted with The Ninth Supplemental Response After Final Rejection dated 11-06-2006, which was not entered by Advisory Action dated 11-15-2007 and which was resubmitted with the Sixteenth Response After Final Rejection dated 01-30-2008, which has **[[not]]** been **[[responded to with an Advisory Action as of the submission of the Corrected Brief]]** **entered in the Examiner's Answer.**

**In the Brief Volume 3 page 5, lines 11 -13,**  
**make the following change.**

Applicants' claims under appeal are directed to an apparatus, device, structure, etc. using high  $T_c$  compositions of matter and based on the Examiner's Third Enablement Statement these claims are enabled

**In the Brief Volume 3 page 8, lines 11 - 22,**  
**make the following change.**

Fig. 8.3 shows details of the conduction layers for difference sequence of copper oxide planes and Fig. 8.4 presents details of the bonding layers for several of the cuprates which include binding layers for lanthanum superconductor **[[La<sub>2</sub>CuO<sub>4</sub>]] La<sub>2</sub>CuO<sub>4</sub>**, neodymium superconductor **[[Nd<sub>2</sub>CuO<sub>4</sub>]] Nd<sub>2</sub>CuO<sub>4</sub>**, yttrium superconductor **[[YBa<sub>2</sub>Cu<sub>3</sub>O<sub>2n+4</sub>]] YBa<sub>2</sub>Cu<sub>3</sub>O<sub>2n+4</sub>**, bismuth superconductor **[[Bi<sub>2</sub>Sr<sub>2</sub>Ca<sub>n-1</sub>Cu<sub>n</sub>O<sub>2n+4</sub>]] Bi<sub>2</sub>Sr<sub>2</sub>Ca<sub>n-1</sub>Cu<sub>n</sub>O<sub>2n+4</sub>**, thallium superconductor **[[Tl<sub>2</sub>Ba<sub>2</sub>Ca<sub>n-1</sub>Cu<sub>n</sub>O<sub>2n+4</sub>]] Tl<sub>2</sub>Ba<sub>2</sub>Ca<sub>n-1</sub>Cu<sub>n</sub>O<sub>2n+4</sub>**, and mercury superconductor **[[HgBa<sub>2</sub>Ca<sub>n-1</sub>Cu<sub>n</sub>O<sub>2n+2</sub>]] HgBa<sub>2</sub>Ca<sub>n-1</sub>Cu<sub>n</sub>O<sub>2n+2</sub>**. Fig. 8.5 at pages 102 and 103 show a schematic atomic structure showing the layering scheme for thallium superconductors. Fig. 8.10 at page 109 shows a schematic crystal structure showing the layering scheme for **[[La<sub>2</sub>CuO<sub>4</sub>]] La<sub>2</sub>CuO<sub>4</sub>**. Fig. 8.11 at page 110 shows a schematic crystal structure showing the layering scheme for **[[HgBa<sub>2</sub>Ca<sub>2</sub>Cu<sub>3</sub>O<sub>8+x</sub>]] HgBa<sub>2</sub>Ca<sub>2</sub>Cu<sub>3</sub>O<sub>8+x</sub>**.

**In the Brief Volume 3 page 9, lines 2 - 4,**  
**make the following change.**

The quoted text of each **[[e]]** claim includes the correction of the typographical errors noted at page 240, of the first page of Section VIII, of Volume 1 of this Corrected Appeal Brief. This has been done so that each claim can be understood.

**In the Brief Volume 3 page 12, lines 2 - 11,**  
**make the following change.**

The Examiner has provided no evidence or argument that a species that comes within the scope of any of Applicants' claims exists, or can be made, but cannot be made and determined to have the high T<sub>c</sub> superconductive property following Applicants' teaching, when viewed from the point of view of a person of ordinary skill in the art as of

Applicants' earliest priority date. The Examiner has provided no reason to doubt that a person of skill in the art as of Applicants' earliest priority date can not practice any of Applicants' claims rejected as not enabled. Thus the Examiner has not made out a prima facie case of lack of enablement. In view thereof Applicants request the Board to reverse the rejections of Applicants' claims for lack of enablement.